

2N6784

2.25A, 200V, 1.500 Ohm, N-Channel Power MOSFET

The 2N6784 is an N-Channel enhancement mode silicon gate power MOS field effect transistor designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high power bipolar switching transistors requiring high speed and low gate drive power. This type can be operated directly from integrated circuits.

Ordering Information

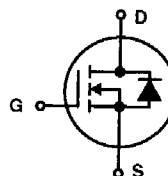
| PART NUMBER | PACKAGE | BRAND |
|-------------|----------|--------|
| 2N6784 | TO-205AF | 2N6784 |

NOTE: When ordering, use the entire part number.

Features

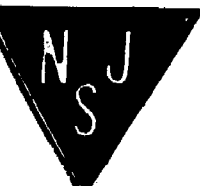
- 2.25A, 200V
- $r_{DS(ON)} = 1.500\Omega$
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

Symbol



Packaging

JEDEC TO-205AF



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

| | 2N6784 | UNITS |
|---|---------------------------|---------------------|
| Drain to Source Breakdown Voltage (Note 1) | V_{DS} 200 | V |
| Drain to Gate Voltage ($R_{GS} = 20k\Omega$) (Note 1) | V_{DGR} 200 | V |
| Continuous Drain Current | I_D 2.25 | A |
| $T_C = 100^\circ\text{C}$ | 1.5 | A |
| Pulsed Drain Current (Note 3) | I_{DM} 9 | A |
| Gate to Source Voltage | V_{GS} ± 20 | V |
| Continuous Source Current (Body Diode) | I_S 2.25 | A |
| Pulse Source Current (Body Diode) | I_{SM} 9 | A |
| Maximum Power Dissipation | P_D 15 | W |
| Linear Derating Factor | 0.12 | W/ $^\circ\text{C}$ |
| Operating and Storage Temperature | T_J, T_{STG} -55 to 150 | $^\circ\text{C}$ |
| Maximum Temperature for Soldering | | $^\circ\text{C}$ |
| Leads at 0.063in (1.6mm) from Case for 10s. | T_L 300 | $^\circ\text{C}$ |
| Package Body for 10s, See Techbrief 334 | T_{pkg} 260 | $^\circ\text{C}$ |

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

- $T_J = 25^\circ\text{C}$ to 125°C .

Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|--|-----------------|---|-----|-----|-----------|--------------------|
| Drain to Source Breakdown Voltage | BV_{DSS} | $I_D = 0.25\text{mA}, V_{GS} = 0\text{V}$ | 200 | - | - | V |
| Gate to Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 0.5\text{mA}$ | 2 | - | 4 | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 200\text{V}, V_{GS} = 0\text{V}$ | - | - | 250 | μA |
| | | $V_{DS} = 160\text{V}, V_{GS} = 0\text{V}, T_C = 125^\circ\text{C}$ | - | - | 1000 | μA |
| On-State Drain Current (Note 2) | $V_{DS(ON)}$ | $I_D = 2.25\text{A}, V_{GS} = 10\text{V}$ | - | - | 3.37 | V |
| Gate to Source Leakage Current | I_{GSS} | $V_{GS} = \pm 20\text{V}$ | - | - | ± 100 | nA |
| Drain to Source On Resistance (Note 2) | $r_{DS(ON)}$ | $I_D = 1.5\text{A}, V_{GS} = 10\text{V}, T_A = 25^\circ\text{C}$ | - | 1.0 | 1.500 | Ω |
| | | $I_D = 1.5\text{A}, V_{GS} = 10\text{V}, T_A = 125^\circ\text{C}$ | - | - | 2.81 | Ω |
| Diode Forward Voltage | V_{SD} | $I_S = 2.25\text{A}, V_{GS} = 0\text{V}$ | 0.7 | - | 1.5 | V |
| Forward Transconductance (Note 2) | g_{fs} | $V_{DS} = 5\text{V}, I_D = 1.5\text{A}$ | 0.9 | 1.3 | 2.7 | S |
| Turn-On Delay Time | $t_{d(ON)}$ | $V_{DD} \cong 75\text{V}, I_D = 1.5\text{A}, R_G = 50\Omega$ (Figure 17) MOSFET Switching Times are Essentially Independent of Operating Temperature | - | - | 15 | ns |
| Rise Time | t_r | | - | - | 20 | ns |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | - | - | 30 | ns |
| Fall Time | t_f | | - | - | 20 | ns |
| Input Capacitance | C_{ISS} | $V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ (Figure 14) | 60 | 135 | 200 | pF |
| Output Capacitance | C_{OSS} | | 20 | 60 | 80 | pF |
| Reverse Transfer Capacitance | C_{RSS} | | 5 | 16 | 25 | pF |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | | - | - | 8.33 | $^\circ\text{C/W}$ |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | Free Air Operation | - | - | 175 | $^\circ\text{C/W}$ |

Source to Drain Diode Specifications

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------------|----------|--|-----|-----|-----|---------------|
| Reverse Recovery Time | t_{rr} | $T_J = 150^\circ\text{C}, I_{SD} = 2.25\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | 290 | - | ns |
| Reverse Recovered Charge | Q_{RR} | $T_J = 150^\circ\text{C}, I_{SD} = 2.25\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | 2.0 | - | μC |

NOTES:

- Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Repetitive rating: pulse width limited by maximum junction temperature. See Transient Thermal impedance curve (Figure 3).